## Bonneville Power Administration
## Fish and Wildlife Program FY98 Watershed Proposal

## Section 1. General administrative information

# Monitor Smolts At The Head Of Lower Granite Reservoir And Lower Granite Dam

**Bonneville project number, if an ongoing project** 8332300

**Business name of agency, institution or organization requesting funding**
Idaho Department of Fish and Game

**Business acronym (if appropriate)** IDFG

**Proposal contact person or principal investigator:**


| | |
|---|---|
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**Subcontractors.**

| Organization | Mailing Address | City, ST Zip | Contact Name |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |

**NPPC Program Measure Number(s) which this project addresses.**
5.9A.1

**NMFS Biological Opinion Number(s) which this project addresses.**
NMFS BO RPA Sec.13a and 13f

**Other planning document references.**
Snake River Salmon Recovery Plan 2.1.d.3

**Subbasin.**
Salmon River, Snake River

**Short description.**
Operate fish traps; monitor migration timing and relative passage index; PIT tag groups of smolts to provide in-season travel time and survival information, including collection of data required for BiOP implementation and decision path determinations.

## Section 2. Key words

| Mark | Programmatic Categories | Mark | Activities | Mark | Project Types |
|---|---|---|---|---|---|
| X | Anadromous fish | | Construction | | Watershed |
| | Resident fish | | O & M | | Biodiversity/genetics |
| | Wildlife | | Production | | Population dynamics |
| | Oceans/estuaries | * | Research | | Ecosystems |
| | Climate | X | Monitoring/eval. | X | Flow/survival |
| | Other | | Resource mgmt | | Fish disease |
| | | | Planning/admin. | * | Supplementation |
| | | | Enforcement | | Wildlife habitat en- |
| | | | Acquisitions | | hancement/restoration |

**Other keywords**.

## Section 3. Relationships to other Bonneville projects

| Project # | Project title/description | Nature of relationship |
|---|---|---|
| 8712700 | NWPPC Slt Monitoring by non-Federal entities | Key Component: This project provides in-season management information for flow and passage management |
| 9403300 | Fish Passage Center | Key Component: Provides in-season management information to FPC for flow and passage management |
| 9107300 | IDFG 'Idaho Natural Produciton Monitoring/Evaluation' | Key Component: Uses project data to generate estimates of survival from point of release to head of L Granite pool |
| 9008000 | PSMFC Columbia Basin PIT Tag Information System | Key Component: Provide PIT Tag information to PTAGIS on a daily basis during outmigration. Idaho Representative to PIT Tag Steering Committee. |
| 9701000 | BPA Essential M&E Infrastructure-PIT Tag Monitor Procurement and | Key Component: Idaho Representative to the ISO Transition |

| | | |
|---|---|---|
| | Inst. | Planning Team |
| 8740100 | USGS Travel time and Survival Smolt Physiology | Key Component: Provide PIT-tagged sample fish |

## Section 4. Objectives, tasks and schedules

### *Objectives and tasks*

| Obj 1,2,3 | Objective | Task a,b,c | Task |
|---|---|---|---|
| 1 | Provide daily trap catch data and a smolt passage index at the head of Lwr Granite Res and the Lwr Salmon R | a | Install Snake and Salmon R. traps and have operational by March 10 |
| | | b | Collect trap catch, hatchery vs wild breakdown, and PIT-tag interrogation data daily |
| | | c | Report trap information to FPC daily |
| 2 | Provide an interrogation site for PIT-tagged smolts | a | Install and maintain PIT-tag detection systems on the Snake and Salmon R. traps |
| | | b | Interrogate all fish collected at the traps for PIT-tags |
| | | c | Report all interrogartion files to PTAGIS within 24 hours of file closure |
| 3 | Determine travel time of PIT-tagged smolts from the point of release to the smolt traps | a | Obtain release information for the various PIT-tag groups and calculate travel time to the traps |
| 4 | PIT tag daily groups of chinook and steelhead for travel time and survival indices from traps to downstream dams | a | PIT tag 200 to 600 wild chinook, hatchery chinook and hatchery steelhead and 200 wild steelhead daily at each trap |
| | | b | Submit PIT-tag tagging files daily to PTAGIS |
| 5 | Determine travel time for hatchery or wild chinook and steelhead smolts from traps to Lwr Granite and detection rate at all dams | a | Retrieve PIT-tag recovery and travel time data from PTAGIS |
| | | b | Calculate migration rate and detection rate information for each |

| | | | |
|---|---|---|---|
| | | | daily release group |
| 6 | Correlate smolt migration rate with river flow | a | Calculate median migration rate from point of release to traps |
| | | b | Calculate median migration rate from traps to Lwr Granite Dam for each daily PIT-tag group. |
| | | c | Statistically analyse data to determine the relation between median migration rate and mean discharge during the median migration period |
| | | d | Determine if there is a yearly variation in the migration rate and discharge relation |
| 7 | Evaluate timing of returning adult wild and natural steelhead crossing Lwr Granite Dam | a | Retieve PIT-tag data on returning adults from PTAGIS and analyse |
| 8 | Analyze data and produce annual report | a | Conduct statistical analysis and produce annual report |
| 9 | Provide fish collection , in excess of SMP needs, for other research projects in the basin as needed | | |
| 10 | Maintain all equipment prior to the field season | a | Do all trap maintenance and repair |
| | | b | Do all boat maintenance and repairs |
| | | c | Do all PIT tag and computer maintenance and repair |
| 11 | IDFG representative to PIT Tag Steering Committee and ISO Transition Planning Team | a | |
| | | | |
| | | | |

### *Objective schedules and costs*

| Objective # | Start Date mm/yyyy | End Date mm/yyyy | Cost % |
|---|---|---|---|
| 1 | 3/1999 | 6/1999 | 15.00% |
| 2 | 3/1999 | 6/1999 | 0.10% |
| 3 | 3/1999 | 6/1999 | 0.10% |
| 4 | 3/1999 | 6/1999 | 15.00% |
| 5 | 7/1999 | 12/1999 | 13.00% |

| | | | |
|---|---|---|---|
| 6 | 7/1999 | 12/1999 | 10.00% |
| 7 | 3/1999 | 12/1999 | 0.10% |
| 8 | 7/1999 | 3/2000 | 13.00% |
| 9 | 3/1999 | 12/1999 | 0.70% |
| 10 | 1/1999 | 12/1999 | 30.00% |
| 11 | 1/1999 | 12/1999 | 3.00% |
| | | | TOTAL 100.00% |

**Schedule constraints.**

**Completion date.**
yearly monitoring program

## Section 5. Budget

### *FY99 budget by line item*

| Item | Note | FY99 |
|---|---|---|
| Personnel | | $160,800 |
| Fringe benefits | | $51,700 |
| Supplies, materials, non-expendable property | | |
| Operations & maintenance | | $129,200 |
| Capital acquisitions or improvements (e.g. land, buildings, major equip.) | Includes two PIT tagging laptop computers needed because of ISO transition @ $2,500 ea | $10,000 |
| PIT tags | # of tags: 20,000 | $58,000 |
| Travel | | $6,000 |
| Indirect costs | | |
| Subcontracts | | |
| Other | | |
| **TOTAL** | | $415,700 |

### *Outyear costs*

| Outyear costs | FY2000 | FY01 | FY02 | FY03 |
|---|---|---|---|---|
| Total budget | $436,500 | $458,300 | $481,200 | $505,300 |
| O&M as % of total | 31.00% | 31.00% | 31.00% | 31.00% |

## Section 6. Abstract

The Smolt Monitoring Program (SMP), which is mandated in the Northwest Power Planning Council's (NPPC) Program, provides data on movement of smolts out of major drainages and past the series of dams on the Snake and Columbia rivers. Indices of migration strength and migration timing are provided for the run-at-large at key monitoring sites. In addition, marked smolts from hatcheries and traps provide measures of smolt speed and in-river survival through key index reaches. These data are used for in-season operational decisions relative to flow and spill management, particularly during periods when spill is being provided to improve smolt passage.

This project, as part of the SMP, provides important information on salmon and steelhead movement at the upper end of the Snake River's series of dams. Fish PIT-tagged at these sites are used to measure migration speed in key reaches of the Snake and Columbia rivers. The determination of the current year's migration timing of ESA listed Snake River salmonid stocks is a key aspect of the year's in-season SMP management decisions. Also documented, is the arrival timing of anadromous smolts at the head of Lwr Granite pool and the migration timing and rate through the Snake and Salmon rivers and Snake and Columbia River reservoirs using the PIT-tagged juveniles captured and marked at the Salmon and Snake River traps. This information is critical for in-season management decisions relative to operations of the FCRPS for fish protection, flow augmentation, facility power operations, fish collections, and transportation programs.

## Section 7. Project description

### a. Technical and/or scientific background.

Daily information on the status of the smolt outmigration for in-season fish passage management needs through the collection and sampling of smolts at monitoring sites in the Snake and Salmon rivers. Aspects of monitoring that are unique at each site are detailed in this section. This project is a component of the basin wide Smolt Monitoring Program (SMP) which is carried out in conjunction with the Fish Passage Center project. The SMP is mandated by the Northwest Power Planning Council Fish and Wildlife Program and is required to implement the measures of the NMFS Biological Opinion. Data developed through the SMP is utilized in development and testing of hypothesis in the regional PATH process.

### b. Proposal objectives.

The SMP provides a long term, consistent database for fish passage management and mitigation decisions. Objectives for operating smolt traps on the Salmon and Snake rivers are: 1) provide daily trap catch data and smolt passage indices to FPC, 2) provide an interrogation site for PIT-tagged smolts marked on other projects, 3) determine travel time for PIT-tagged smolts from the point of release to the traps and from the traps to Lwr Granite Dam, 4) determine the PIT tag detection rate for smolts at LGR, LGO, LMO, and MCN, 5) correlate smolt migration rate with river flow for fish migrating in a riverine and

reservoir environment during the spring outmigration, 6) provide smolt-to-adult survival indices, and 7) provide annual report summary.

**c. Rationale and significance to Regional Programs**.

This project is part of the non-federal entities portion of the regional SMP. SMP data provides an essential component in making real time and future decisions with regards to wild and hatchery salmonids and how flow augmentation and spill affect survival, migration rate, and migration timing. Decision-makers utilize information provided by the SMP on the spring and summer outmigration timing of wild and hatchery chinook salmon and steelhead trout smolts. They also use the data on PIT-tagged fish arrival timing at dams, travel time to dams, and relative survival to dams for in-season information on which to base flow augmentation and spill decision relative to management of ESA listed stocks of chinook and steelhead.

**d. Project history**

**Project history:**

This project is a component of the basin-wide SMP, which is the basis of flow and passage management. Initiated in 1983 by the NMFS who built and installed traps on the Snake, Clearwater and Salmon rivers. The IDFG assumed responsibility for the project in 1984 and continues to operate traps on the Salmon and Snake rivers as part of the annual coordinated regional SMP. Trap operations provide data on outmigration timing and biological characteristics of outmigrating smolts and serve as sites for PIT tagging smolts for subsequent analysis of travel time and survival indices to downstream dams. Traps operate from March 15 through June 15 and approximately 23,000 PIT tags are applied at these sites. This program has been funded since 1983 at a total cost of $3.7 million.

**Project Reports and Technical Papers:**

Annual Report series under "Downstream Migration and Water Budget":
Title: "Smolt Monitoring At the Head of Lower Granite Reservoir and Lower Granite Dam".
1983-DOE/BP 253(NMFS); 1984-DOE/BP 11631-1(IDFG); 1985-DOE/BP 11631-2(IDFG); 1986-DOE/BP 11631-3(IDFG); 1987-DOE/BP 11631-4a(IDFG); 1988-DOE/BP 11631-4; 1989-DOE/BP 11631-6(IDFG); 1990-DOE/BP 11631-7(IDFG); 1991-DOE/BP 11631-8(IDFG); 1992-DOE/BP 11631-9; 1993-DOE/BP 11631-10(IDFG); 1994-DOE/BP 11631-11; 1995(IN PRESS)-DOE/BP 11631-12(IDFG); DRAFT 1996-DOE/BP 11631-13(IDFG).

**Major Results Achieved:**

Progress is measured by noting whether or not we are obtaining the necessary data. An evaluation of the effectiveness of downstream migration protection actions is contained in

the annual reports of the FPC. The FPC reports analyze and synthesize the information from this project together with the information collected by all other SMP projects and other environmental information. Progress is measured by comparing the results of these reports over the years.

The quality of passage conditions at the Snake River dams directly affects survival to the estuary and eventually to adults. Whatever can be done operationally, to ensure a higher quantity of smolts leaving the system is a priority for this project (i.e. reduce descaling, lingering in areas where $H_2O$ temperatures increase occasionally, etc.). The travel time and flow relation of smolts is quantified along with the documentation of the actual migration timing for each species for a particular year. Ballpark estimates of survival are calculated from tag observations as fish move downstream through the system and at their return as adults. Results have included the outmigration timing of smolts, biological characteristics of smolts, and relative effects of water temperature and water discharge on outmigration of wild and hatchery chinook salmon and steelhead trout smolts. PIT tagging studies have allowed distinction of chinook salmon and steelhead trout smolts migrating through the Snake and Columbia River hydroelectric projects. Results from chinook salmon and steelhead trout smolt outmigration timing data and from PIT tag interrogation information at the dams have allowed managers increased information to make informed decisions concerning flow augmentation and spill planning. Documenting dam arrival timing of wild chinook smolts has assist managers to implement spill to benefit smolt survival at hydroelectric facilities.

**Adaptive Management Implications:**

This project, as part of the SMP, provides important information on salmon and steelhead smolt movement at the upper end of the Snake River's series of dams. This information is used for in-season operational decisions relative to flow and spill management. Fish PIT-tagged at these sites are used to measure migration speed in key reaches of the Snake and Columbia rivers. The determination of the current year's migration timing of ESA listed Snake River wild chinook salmon stocks is a key aspect of the year's in-season SMP management decisions. This provides mangers in-season information on which to base flow augmentation and spill decisions relative to management of endangered chinook salmon juveniles and wild steelhead trout. In addition, smolt-to-adult survival indices will contribute to the decision path regarding long term mitigation measures.

**e. Methods**.

**<u>Smolt Monitoring Traps</u>**

During the 1999 outmigration, two smolt-monitoring traps will be operated to monitor the passage of juvenile chinook salmon and steelhead trout. A scoop trap (Raymond and Collins 1974) is located on the Salmon River, near Slate Creek, Idaho. A dipper trap (Mason 1966) is located on the Snake River near Lewiston, Idaho. Smolts will be captured, examined, and enumerated daily at the traps and released back to the river. Fork length of up to 100 smolts for each species and rearing type will be measured to the nearest millimeter. Between 200 to 600 hatchery chinook salmon, wild chinook salmon, hatchery steelhead trout, and all wild steelhead trout will be PIT-tagged (Prentice

et al 1987) weekly, for a season total of 11,400 at the Snake River trap and 12,000 at the Salmon River trap (sample size established by FPC). Up to 2,000 fish will be examined daily for hatchery brands at the Snake River trap. Fish are not examined for brands at the Salmon River trap. Smolts are anesthetized before handling with tricaine methanesulfonate (MS-222). Fish are allowed to recover from the anesthesia before being returned to the river.

The Fish Passage Center requested that all smolt-monitoring projects reduce handling of fish listed under the Endangered Species Act. To comply with this request, sampling regimes and quotas will be adjusted at all of this project's collection sites. Sampling periods are based on a standard work week (Monday-Friday) with Saturday and Sunday left available, if necessary, to fill quotas. Once 600 hatchery chinook salmon, wild chinook salmon, hatchery steelhead trout, and wild steelhead trout are PIT tagged to fulfill the weekly quota, operations will be suspended until the beginning of the next sampling period. Generally, the PIT tag quotas are observed. FPC also uses PIT tag data from this project for survival estimates, travel time characteristics, migration rate discharge relations, PIT tag passage distribution, and passage timing and indices.

All fish captured in the Snake and Salmon River traps are passively interrogated for PIT tags as they entered the live well. The interrogation and tagging information is sent to the PTAGIS Data Center (managed by Pacific States Marine Fisheries Commission) daily.

Water temperature (CE) and transparency (m) are recorded daily at each trap using a centigrade thermometer and 20 cm secchi disk. Snake River discharge is measured at the U.S. Geological Survey (USGS) Anatone gauge (#13334300), 44.4 km upstream from the Snake River trap. Salmon River discharge is measured at the USGS White Bird gauge (#13317000), 16.6 km downstream from the Salmon River trap.

**Snake River Trap**

The Snake River trap is positioned approximately 40 m downstream from the Interstate Bridge, between Lewiston, Idaho and Clarkston, Washington. The trap is attached to bridge piers just east of the drawbridge span by steel cables. This location is at the head of Lower Granite Reservoir, 0.5 km upstream from the convergence of the Snake and Clearwater arms. River width and depth at this location are approximately 260 m and 12 m, respectively.

Chinook salmon and steelhead trout smolts are PIT-tagged at the Snake River trap to estimate travel time from the head of Lower Granite Reservoir to Lower Granite Dam. Median travel time of the daily PIT-tagged release groups is converted to migration rate. Migration rate is correlated with mean Lower Granite Reservoir inflow discharge for the number of days equal to the median travel time to determine how changes in discharge affect smolt migration rate through Lower Granite Reservoir.

The PIT tag interrogation system on the Snake River trap consists of an 8-inch PVC pipe with two interrogation coils (D-4 and D-6). Each coil is connected to an exciter card and a PIT tag reader. The system does not have the capability to provide exact time of capture and therefore the interrogation time is set to 00:00 h. Coil

efficiency tests are conducted on the dipper trap interrogation system. The reading efficiency was calculated to be 97.4% for both coils combined.

**Salmon River Trap**

The Salmon River trap site is located at rkm 103. The scoop trap is immediately downstream of the upper U.S. Highway 95 bridge at Twin Bridges. River width at this location is approximately 90 m and varies with discharge. Depth is between 3-4 meters.

Chinook salmon and steelhead trout juveniles are tagged with PIT tags at the Salmon River trap to estimate smolt travel time from the lower portion of the Salmon River to Lower Granite Dam. Median travel time for the daily PIT-tagged release groups is converted to migration rate. Migration rate is correlated with mean Lower Granite Reservoir inflow for the median travel time to determine how changes in discharge affected smolt migration rate through the Lower Salmon River and Lower Granite Reservoir.

The PIT tag interrogation system on the Salmon River trap consists of a 4-inch PVC pipe with two interrogation coils. Each coil is connected to an exciter card (D-8) which in turn, is attached to a single PIT tag reader. Coil efficiency tests are conducted on the Salmon River trap interrogation system and reading efficiency is calculated to be 100% for both coils combined.

## Trap Efficiency

Trap efficiency is the proportion of the migration run being sampled. Since trap efficiency may change as river discharge changes, efficiency has been estimated several times through the range of discharge at which the trap was operated. A linear regression equation (Ott 1977) describing the relation of trap efficiency and discharge was derived to estimate efficiency at any given discharge. During the 1996 trap operations, trap efficiencies were not calculated for any of the smolt traps. Buettner (1991) reports previous trap efficiency estimates.

### Travel Time and Migration Rates

Migration statistics are calculated for hatchery release groups from release sites to traps. Travel time and migration rates to the traps are calculated using median arrival times at the Snake and Salmon River traps. Median arrival (or passage) date is the date the 50th percentile fish arrived at the trap or collection facility. Smolts are PIT-tagged at the Snake River trap to determine travel time from the head of Lower Granite Reservoir to Lower Granite Dam. Smolts are PIT-tagged at the Salmon River trap to determine migration rate in a free-flowing section of river plus Lower Granite Reservoir. Individual arrival times at the Lower Granite collection facility are determined for each daily release group. A minimum recapture number, sufficient for use in travel time and migration rate estimations, is derived from an empirical distribution function of the travel time for each individual release group (Steinhorst et al. 1988). If recapture numbers are less than five or less than the number derived from the empirical distribution function, the daily data are

combined with another day's data or the data were not used. If they are combined, they are added to daily data from an adjacent release day that had similar discharge and travel time.

Smolt migration rate/discharge relations through Lower Granite Reservoir are investigated using linear regression analysis after both variables are stratified into 5-kcfs discharge intervals (Mosteller and Tukey 1977) and log (ln) transformed (Zar 1984). The 0.05 level is used to determine significance. This analysis is performed for the PIT-tagged hatchery spring/summer chinook salmon, wild spring/summer chinook salmon, hatchery steelhead trout, and wild steelhead trout groups marked at the Snake or Salmon River traps.

The migration rate/discharge relations for PIT-tagged chinook salmon, hatchery steelhead trout, and wild steelhead trout released from the Snake River trap are individually examined using analysis of covariance to determine if there are groups of years with common slopes and intercepts. Plots are used to help identify years that differ when non-homogeneous slopes between years are found. Subsequent analyses are run, without these years, to determine if common slopes and intercepts existed for a smaller subset of years. Also, the analysis of variance is used to determine if there is a sufficient overlap in the covariate (discharge) between years to continue the analysis (Ostle and Mensing 1975). If the final hypothesis of common intercepts is not rejected, then a significant difference in the migration rate/discharge relations between years is not detected and the yearly data are pooled. After pooling, linear regression is used to find the best-fitting equation to describe the relation between migration rate and discharge for an individual species over several years.

### Interrogation Rates of PIT-Tagged Fish

Interrogation rates of PIT-tagged fish, marked at the head of Lower Granite Reservoir, to Lower Granite Dam, Little Goose Dam, Lower Monumental, and McNary Dam collection facilities includes data from 1988 to present for the Snake River trap, 1989 to 1995 for the Clearwater River trap, and 1993 to present for the Salmon River trap. The data have been examined to ensure that multiple interrogations within a dam and between dams have been removed.

## f. Facilities and equipment.

Two smolt monitoring traps, a dipper trap on the Snake River and a scoop trap on the Salmon River, are used to collect smolts. A third trap, which was used on the Clearwater River between 1984 and 1995, is used as backup for the Salmon River trap. Three boats are used on this project, one each for the Snake and Salmon River traps and one for backup. A purse seine barge is utilized for moving the Snake River trap components at the beginning and end of each field season and used to capture fish to supplement Snake River trap catch, when needed. Each trap has a PIT tag interrogation system. There is sufficient PIT tagging equipment for both traps. The project has two 586 desktop computers for data storage and manipulation, administration, and electronic

communication and two lap top computers for PIT tagging. When the Columbia Basin wide transition to the ISO 134.2 kHz PIT tag system occurs, the lap top computers will need to be replaced. Office facilities consist of a four-office complex, which is shared by other BPA, and LSRCP funded programs. Storage consists of a four bay open faced boat shed, for boat storage, and one closed bay for equipment storage.

**g. References**.


Buettner, E.W. 1991. Smolt monitoring at the head of Lower Granite Reservoir and Lower Granite Dam. Report of Idaho Department of Fish and Game to Bonneville Power Administration, Project 83-323B, Portland, Oregon.

Mason, J.E. 1966. The migrant dipper: a trap for downstream migrating fish. Progressive Fish Culturist 28:96-102.

Mosteller, F., and J.W. Tukey. 1977. Data analysis and regression. Addison-Wesley Publishing, Reading, Massachusetts.

Ostle, B., and R.W. Mensing. 1975. Statistics in Research, 3rd Edition. The Iowa State University Press, Ames, Iowa.

Ott, L. 1977. An introduction to statistical methods and data analysis. Duxbury Press, North Scituate, Massachusetts.

Prentice, E.F., T.A. Flagg, and S. McCutcheon. 1987. A study to determine the biological feasibility of a new fish tagging system, 1986-1987. Report of U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Northwest and Alaska Fisheries Center to Bonneville Power Administration, Project 83-19, Portland, Oregon.

Raymond, H.L., and G.B. Collins. 1974. Techniques for appraisal of migrating juvenile anadromous fish populations in the Columbia River Basin. IN: Symposium on methodology for the survey, monitoring and appraisal of fishery resources in lakes and large rivers. Food and Agricultural Organization of the United Nations, European Inland Fisheries Advisory Commission, EIFAC/74/I/Symposium-24, Rome, Italy.

Steinhorst, K., B. Dennis, A. Byrne, and A. Polymenopoulos. 1988. Tools for analyzing fish travel time. Report of University of Idaho Statistical Consulting Center to Idaho Department of Fish and Game, Boise, Idaho.

Zar, J.H. 1984. Biostatistical analysis, 2nd edition. Prentice-Hall, Inc., Englewood Cliffs, New Jersey.

## Section 8. Relationships to other projects

This project is a portion of the Columbia Basin wide Smolt Monitoring Program. As such, it provides information important to the management of the river corridor for ESA listed stocks of chinook salmon and steelhead trout.

## Section 9. Key personnel

**EDWIN BUETTNER**
**Senior Fisheries Research Biologist**
Idaho Department of Fish and Game
1540 Warner Ave
Lewiston, Idaho 83501

**Education:**
Bachelor of Science, University of Idaho, Moscow , Idaho. General Biology, 1975
Masters of Science, University of Idaho, Moscow, Idaho. Fisheries Resources, 1987

**Current Responsibilities:**
Program leader for the =Smolt Monitoring at the Head of Lower Granite Reservoir and Lower Granite Dam= project. Responsibilities include project administration, personnel supervision and overseeing field operations and equipment maintenance. Other duties include the IDFG representative to the PIT Tag Steering Committee and to the ISO Transition Planning team.

**Recent Previous Employment:** IDFG employment since 1984.

**Expertise:**
Operation of large smolt traps on large rivers during spring runoff. Also used purse seine equipment to capture smolts. Capture, handle and examine large numbers of anadromous smolts and mark with PIT tags, freeze brands or fin clips. Familiar with the PIT tag data repository, PTAGIS, and high degree of knowledge and experience PIT tagging fish.

**Recent Publication:**
Buettner, E.W. and A.F. Brimmer. 1992. Smolt Monitoring at the Head of Lower Granite Reservoir and Lower Granite Dam. Report of Idaho Department of Fish and Game to Bonneville Power Administration, Project 83-323B, Portland, Oregon.

Buettner, E.W. and A.F. Brimmer. 1993. Smolt Monitoring at the Head of Lower Granite Reservoir and Lower Granite Dam. Report of Idaho Department of Fish and Game to Bonneville Power Administration, Project 83-323B, Portland, Oregon.

Buettner, E.W. and A.F. Brimmer. 1994. Smolt Monitoring at the Head of Lower Granite Reservoir and Lower Granite Dam. Report of Idaho Department of Fish and Game to Bonneville Power Administration, Project 83-323B, Portland, Oregon.

Buettner, E.W. and A.F. Brimmer. 1995. Smolt Monitoring at the Head of Lower Granite Reservoir and Lower Granite Dam. Report of Idaho Department of Fish and Game to Bonneville Power Administration, Project 83-323B, Portland, Oregon.

Buettner, E.W. and A.F. Brimmer. In Press. Smolt Monitoring at the Head of Lower Granite Reservoir and Lower Granite Dam. Report of Idaho Department of Fish and Game to Bonneville Power Administration, Project 83-323B, Portland, Oregon

## Section 10. Information/technology transfer

Data is shared with FPC and PTAGIS electronically. The IDFG produces an annual report, which is published by BPA.